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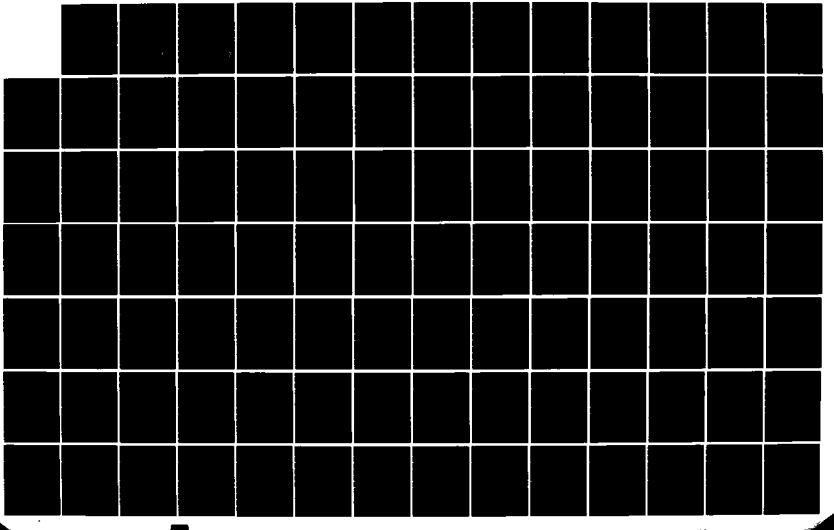

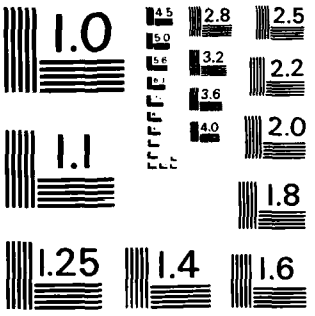

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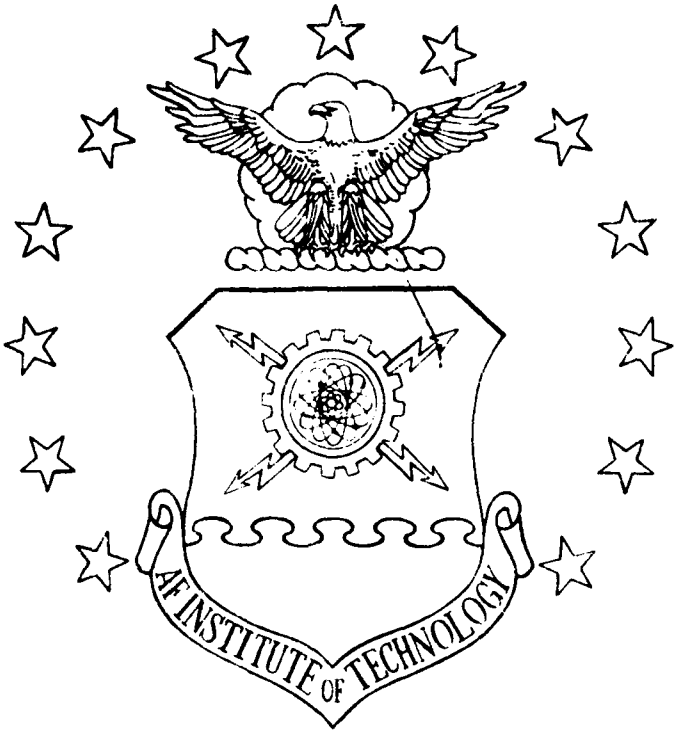

APPLICATION OF THE CRITICAL SUCCESS FACTOR METHODOLOGY TO DOD ORGANIZATIONS

THESIS

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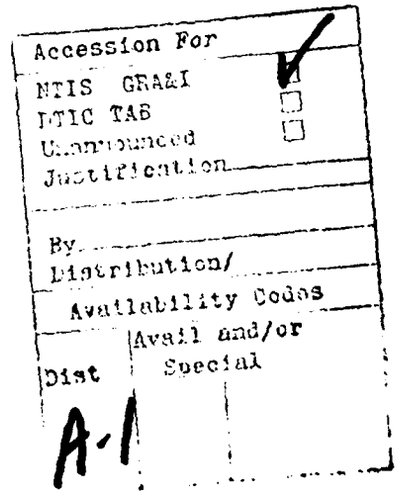

AFIT/GSM/LSY/84S-6

APPLICATION OF THE CRITICAL SUCCESS FACTOR METHODOLOGY TO DoD ORGANIZATIONS

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

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Abstract

This research investigation analyzes one of the first applications of the Critical Success Factor (CSF) Method at a DoD organization. The DoD organization that the CSF method was applied to is the Air Force Systems Command's Foreign Technology Division (FTD).

The application was accomplished using the CSF method developed by MIT's Sloan School of Management. The CSF method uses a semi-structured interview and open ended questions to determine the critical information needs of the organization's top managers. The CSF method overcomes the problem of providing too much, and very often useless information to top managers that other methods provide, by determining those few areas that need to be performed satisfactorily in order to accomplish the goals of the manager/organization. The investigation is provided with sufficient detail and explanation so that it can be used as a guide for determining the CSFs of other DoD organizations. The results of the application of the CSF method at FTD show that the CSF method can be successfully applied to a DoD organization for determining top level managers information requirements. The results of this investigation indicate that the CSF method is useful enough to be considered prior to the development of any DoD organization's top level management information system.

APPLICATION OF THE CRITICAL SUCCESS FACTOR METHODOLOGY TO DOD ORGANIZATIONS

I. Introduction

In today's world of business operations, it is becoming extremely important for organizations to incorporate the right business practices in order to survive in the aggressive competitive nature that pervades most industries. In order to gain or maintain as effective and efficient a stature as possible, organizations of all varieties are employing computers as a management aid. Data from all aspects of the company are gathered and presented in some form to all levels of management. These data are then processed into a form that is meaningful to the user, becoming information that can be useful for making management decisions (7:4).

It is common however, that the top managers' information requirements are not as clearly defined as they are for functional managers and line supervisors. Hence, these managers are often presented with a very large amount of information. From this inundation of information, the top managers must determine what is relevant to that particular position and what is not. This suggests that some method or technique is needed that will define the top manager's information needs and alleviate this information overload.

John Rockart, director of the Center of Information Systems Research at The Sloan School of Management, Massachussetts Institute of Technology (MIT), has developed the Critical Success Factors (CSF) Method of determining the information needs of top managers. CSFs are those few areas which, if performed satisfactorily, will ensure successful performance of the organization. In his article "Chief Executives Define Their Own Data Needs" (20), Rockart explains the advantages and disadvantages of several methods used to provide top executives with the information needed for those positions. He then describes the CSF method which he suggests to be "highly effective in helping executives to define their significant information needs" (20:84-85). If this CSF method is as effective and efficient a method as described, would it be appropriate to apply to a DoD organization?

Specific Problem

Management Information Systems (MIS) are intended to provide the using management with needed information about the various aspects of the organization from which decisions are made crucial to the operation of the firm. As will be discussed later, this is not necessarily the case for existing MISs. The problem is twofold: 1. the management does not use the MIS, and 2. the information provided by the MIS is not the most appropriate, for one reason or another, for helping the manager make a decision (8:29+, 4:34, 16:45, 25:20).

Even though the description of this marginal MIS situation exists for many industries, it is not limited to the private sector alone. The problem exists in the DoD Services as well. This is evidenced by many DoD Service organization's obsolesence or non-existence of Information Systems (IS) or Decision Support Systems (DSS).

These systems need to be used for their intended purpose of providing needed information to the manager as an aid for making decisions. But these systems need to be designed to accommodate the individual manager. "It is clear that a problem exists with defining exactly what data the chief executive (or any other general manager) needs" (20:82). This problem exists with DoD managers as it does with other industry managers in which the key factors or critical areas of concern to a manager are not defined. If they are not defined, that information is more difficult to obtain. This situation has the potential to reduce the effectiveness of the manager and therefore the performance of the organization.

Scope of the Research

A thorough literature search has failed to show the CSF method as having been applied to the DoD. With the limited time available for completing this research, it was determined that the CSF method could be applied to only one major DoD organization for determining the specific application of the CSF method. The Foreign Technology Division (FTD) within the Air Force Systems Command was

selected for performing this research. This selection is based on their recognition of the need for defining the information requirements of the managers within the organization, and on their desire to improve the existing MIS at FTD.

Literature Review

Background. Information processing technology is quickly becoming a standard management tool that has uses from word processing, to decision aids, to strategic management diagnosis. The degree to which information processors, also called information systems (IS), are used by management varies from company to company, and from manager to manager within the companies. These managers are being provided with a wealth of information by their organizations' management information systems (MIS), but much of this information is often of little use to the manager because it is not in the form that he needs.

Decision Support Systems. The MIS approach of the past tended to give the manager too much data and not enough information from which decisions could be made (25:20). A Decision Support System (DSS) improved on the MIS approach, and is designed to help decision makers solve their company problems by providing less of this extraneous information. A DSS can help the manager's decision process become easier when dealing with the company's semi-structured and unstructured problems by combining the use of computer models with human analysis (18:36-37). It is a commonly used term

which describes the application of computer-based systems for providing information in the support of management decision making (13:84). Much that is now written and said about the goals of DSS "is similar to those things that were espoused as the purposes of 'management information systems' (MIS) a decade or so ago" (13:84).

How must a DSS be better than a MIS in order to be beneficial to management? A DSS attempts to improve on the MIS concept by being different in three ways:

> •DSS must be effective as well as efficient. The speed in sorting through millions of bits of information is not as important as the 'effect' of the system.
>
> •DSS affects all managerial levels as opposed to MIS which, at least, was perceived as a service to top management only.
>
> •DSS is less structured in programs and procedures (25:20).

With the improvement in the DSS approach over the MIS approach of the past, the organization should show improvement in performance, which should thereby help insure the future success of that organization (8:39, 25:20-22).

What Determines Success? Successful operation of a firm should not depend on the information system alone. It is the challenge of the managers to use the information that is available. In most cases, "technology is not the stumbling block" (17:147). The reluctance of managers to properly employ their MIS is that they are "disenchanted by their previous exposure to ill conceived forays into management information systems and word processing, [and doubt that their]

workers will embrace the new technology. . ." (17:147). The focus of many of these managers is on the problems created by computers and on growing budget requests rather than on ways in which the firm can make use of this technology (14:25). If the managers believe they are unable to control the quality of the MIS output of the firm, they are unlikely to rely on the MIS in meeting critical goals (4:34; 14:28-29; 15:30-31; 22:5). However, to be successful in the next decade, executives must learn to deal with information technology, as well as devote time and resources to the information processing activities (14:25).

The next logical and necessary realization of MIS utilization is providing the manager with information designed to that manager's needs. Once information needs are accurately identified, "operational procedures and computer software can be developed or [existing systems] modified to collect, store and report data required for management purposes" (23:303). When developing these information needs, "managers who are given the opportunity to obtain essentially 'free' information will tend to request more than they need or could reasonably use" (1:149). Becker and McClintock reviewed research findings related to this issue and concluded that people "appear to use only the 'key' facts, yet are willing to pay for all the facts, useful and useless" (5:475). How then can these information needs be determined, so the organization's IS can support them?

Determining Information Needs

There are a variety of ways being used presently that deal with developing the management-level information needs. Whether these methods are effective in achieving what they purport is not conclusive from the reports of those who have employed them.

Nonetheless, whatever method is used in determining these information needs, it "should be able to 1) produce periodic reports tailored to the unique information needs of individual managers; 2) produce, on request, 'demand reports,' which contain more detailed information than that provided in routine reports; and 3) support ad hoc inquiries into the [firm's] data base for information associated with special studies, strategic planning activities, and other needs" (23:303). In order to provide this information, the data base of the IS must not only contain the necessary data as required by these information requests, but the means must exist for timely updates to the data base so the information produced from them can be relevant and current (23:303).

The by-product technique is one method used to determine information needs. However, with this method, "little attention is actually paid to the real information needs of the chief executive" (20:82). The information to be supplied to the managers is determined by the systems analyst/ designer. The system used to supply this information is usually the computer that is dedicated largely to the operational type of processes, for example - payrolls,

accounting, among others. These information products "are essentially by-products of a particular system designed primarily to perform routine paperwork processing . . .. It leads, to [a] welter of reports . . . [and] has the paper-processing tail wagging the information dog" (20:82). The only advantage of this frequently used method is it doesn't take up managerial time (20:82, 23:304).

Another method is the Null approach, and can be described by the attitude that:

> Top executives' activities are dynamic and ever changing, so one cannot predetermine exactly what information will be needed to deal with changing events at any point in time. The executives, therefore, are and must be dependent on future-oriented, rapidly assembled, most often subjective, and informal information delivered by word of mouth from trusted advisors (20:82).

The advantages of this approach contrasts "the uselessness of the reports developed under the by-product method" (20:82). Since these reports will not be used, the manager "relies very heavily on oral communication" (20:83). Rockart refers to Henry Mintzberg's viewpoint when making the point that "the managers' inputs are soft and speculative - impressions . . . hearsay, gossip" (20:83) and that hard data is not used. However, he goes on to say that there are data (formal and informal) that the manager needs on a regular basis, and that this should be supplied, which this null approach does not do (20:83).

The Key Indicator system emphasizes the business wide factors in providing information. There are three concepts which receive this attention.

> The first concept is the selection of a set of key indicators of the health of the business. Information is collected on each of these indicators. The second concept is exception reporting - that is, the ability to make available to the manager, if desired, only those indicators where performance is significantly different (with significance levels necessarily predefined) from expected results. The executive may thus pursue all the data available *or* focus only on those areas where performance is significantly different from planned. The third concept is the expanding availability of better, cheaper, and more flexible visual display techniques (20:83).

The most common use of this system is for financial data. "The report...is ever changing, but its orientation toward 'profit and loss' and 'balance sheet' data, as well as ratios drawn from these financial data is evident" (20:83-84).

An approach that tries to improve on the existing IS products is the Total Study Process. The information requirements of the managers are compared to that which they are already being provided. Deficiencies are identified and are satisfied on a priority basis assigned by the management (20:84). "The objectives of the process are to develop an overall understanding of the business, the information necessary to manage the business, and the existing information systems" (20:84). But this method "is expensive in terms of manpower and [is] all-inclusive in scope" (20:84). This suggests that there is an extremely large amount of data which can be unwieldly when performing analyses.

There are other methods possible for use in determining executive level information needs. Some of those other

methods, as well as those just described are summarized in Table I. This table lists the methods' names, provides a description of each method, and then a brief advantage/disadvantage comparison.

The Critical Success Factor Method. The CSF method focuses on individual managers and on each manager's current information needs. It provides for identifying managerial information needs in a clear and meaningful way. Moreover, it takes into consideration the fact that these needs will change with time for a particular manager.

The CSF concept was developed by the Sloan School of Management at the Massachusetts Institute of Technology under the direction of John Rockart "in an attempt to overcome some of the shortcomings of the [other] approaches discussed earlier [by focusing] on *individual managers* and on each manager's *current information needs* - both hard and soft" (20:85). CSFs are:

> the limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department or organization. CSFs are the few key areas where 'things must go right' for the business to flourish and for the manager's goals to be attained (6:7).

This concept broadens the scope of information systems beyond the more commonly regarded computer applications, to include all kinds of information. "The challenge is to develop an effective means for measuring CSFs and monitoring organizational or individual performance with information systems through creative use of available information sources and the computer" (12:43-44).

TABLE I

Common Methods for Determining Manager's Information Needs (23:304)

Method	Description	Advantages/disadvantages
Unstructured-interview method	Interviewer asks manager to list specific types of information he or she needs reported on routine basis.	Adv.: Simple to use. Disadv.: No structure for assuring completeness and conciseness of information specifications; responses are likely to be biased by manager's recent experiences.
Incremental (or prototype) method	Manager is initially asked to list minimal information requirements. System is designed to provide this information. Over time, manager refines his or her information needs, and system is modified accordingly.	Adv.: Decreases likelihood of manager specifying irrelevant information; provides for improving completeness of information specifications over time. Disadv.: Initial specification of information needs likely to be incomplete; may involve frequent changes in information system design.
Group process method	Several people in similar managerial positions reach consensus on types of information they would like reported on routine basis.	Adv.: Includes ideas of several managers with similar responsibilities, and resulting information specifications likely to be more complete than those defined with unstructured interview of one manager. Disadv.: Information specification not tailored to needs of the individual manager; group process includes no structure of assuring completeness and conciseness of information specifications.
Current report analysis method	System analyst/designer reviews reports currently provided to manager and modifies systems as necessary to eliminate duplicative reporting, consolidate reports or otherwise improve report formats.	Adv.: Does not require managerial time in information requirements specification. Disadv.: Does not consider manager's views about appropriateness or usefulness of information provided, and tends to perpetuate existing system inadequacies.
Decision analysis method	Manager first asked to identify all decisions for which he or she is responsible. Manager and analyst model each decision and, from models, determine information manager needs to have.	Adv.: Provides structure (list of decisions) for improving completeness and conciseness of information specification; guards against bias in responses from manager's recent experiences. Disadv.: Cannot assure that list of decisions are complete; does not provide for identifying information needed for management control.

CSF Development. The CSF concept is based on an approach that first appeared in a 1961 Harvard Business Review article by D. Ronald Daniel (9). This article describes the common problem most companies face of "inadequate managerial information." (9:111). The problem is not a lack of information, but that the information is not in the form that is useful for managerial decisions. Daniel points out that an MIS must "determine the factors that really contribute to the competitive success in the particular business in question" (9:120). He also states that in most industries there are three to six "success factors" that will determine that particular industry's success.

CSF Areas. The areas that must be analyzed to determine an organizations CSFs are discussed by Daniel (9), Anthony (2), and Rockart (20). Daniel stresses that in determining these "success factors," certain areas of information generation must be evaluated. These areas of information are environmental, competitive and internal. Anthony and others use three areas that are almost the same as those discussed by Daniel. Anthony adds that CSFs must be tailored to the specific company and to the individual manager (2:148). Rockart (20) uses the three areas of Daniel's article that focus on determining success factors, then through analysis Rockart and the Sloan School of Management, developed four areas that must be analyzed to determine CSFs. These four potential sources of CSFs as provided by Rockart (20:86-87) are:

1) The structure of the particular industry; this includes the concerns that each firm of the industry have in common due to the nature of that line of business.

2) Competitive strategy, industry position and geographic location; each of these determine the firm's market share.

3) Environmental factors; these are areas which are beyond the firm's control, but must be dealt with, such as business or economic fluctuations and trends.

4) Temporal factors; the short lived areas that usually cannot be anticipated very far in advance of needing attention.

The above factors are essentially the same as those first presented by Daniel, except that Rockart and the Sloan School of Management have provided an expanded explanation of each area.

How CSFs are Determined. The CSFs of an individual or an organization are determined through the use of a two-phase interview procedure and a data analysis technique (6:45-63). In the first phase, the analyst interviews the organization's executives to jointly determine the managers' CSFs. Once this phase is completed, the analyst groups and combines all of the individual's CSFs into the CSFs and information needs of the organization, followed by agreement of final CSFs by the managers. The second phase of the interviews is then conducted to determine the measure of each CSF, and the data required for each measure. The interview process helps take the manager's implicit information requirements and makes them explicit in the form of three to eight CSFs. Rockart found that managers had a clear view of their own CSFs and were not hesitant in identifying those CSFs (19:12). Once

these information requirements become explicit, the MIS can be structured to provide information which will then be in a form that is useful to the managers.

Benefits of CSFs. There are many benefits related to the use of the CSF method. The use of CSFs helps management focus on those few critical areas that determine the success of the organization. The CSF method also allows executives to determine the information they need and also the data that their MIS must use to produce that information (21:11). CSFs also help remove, or at least reduce, the amount of useless information managers receive. An example of this is portrayed in the situation facing the president of a $60 million microwave communication sales organization, in which he was receiving 97 reports a month, but few provided anything more than "score keeping data" such as monthly profit statements (20:88). Through the use of the CSF method, he helped determine 7 CSFs that provided him with the information he needs to run his organization. The primary purpose and main benefit realized of CSFs is that it provides the manager with more time to deal with the more important functions associated with his or her position.

Examples of CSF Applied. There have been over 200 companies that have used the CSF technique (11:24). The CSF method has been used by industries such as high technology manufacturing, banking, airline, insurance, railway, and automobile.

Bullen (6:22-25) lists the current CSFs of the

automobile industry as image, quality dealer system, cost control, and meeting energy standards. However, in 1961 the automobile CSFs included only styling, quality dealer system, and cost control. At that time, the style of the car had a large influence on car purchases. High tail fins and lots of chrome, among other features were prevalent 20 years ago and therefore important that car makers appeal to the styling desires of the car buyer. It was also important that dealer quality was high, mostly from the view that the dealer was the direct representative of the automakers. This would have a direct bearing on current car purchases as well as future car buys. And finally cost control influenced the auto industry as a CSF, since profit per automobile had a direct relationship with controlling the industry costs. The more efficient the production line, the higher the profits compared to other automakers.

In 1977, after the government required the industry to meet pollution standards, the CSF "meeting energy standards" was added. It can be easily seen that this would be an environmental CSF. Later, in the 1978 oil price surge, public awareness of the limited nature of fossil fuels changed the industry outlook to smaller, more fuel conservative cars. As the foreign automobile sales increased, the styling CSF was changed to image, which represents efficiency, reliability, maintainability, comfort and patriotism (6:22-25). This affected the view of cars from flashy style features to less frills, aerodynamic and more efficient "image" that currently pervades the industry.

Therefore, the original list of auto industry CSFs of styling, quality dealer system and cost control changed, to exchange styling features for more image features and added energy standards. It is readily evident from the competitive nature of the auto industry why these CSFs are at work. Environmental, temporal, and industry factors all affect the CSFs of the industry and firms within the industry. When these factors change, as they have in the auto industry, firms of that industry will have to accommodate those factors or risk losing their competitive ability.

In another example, the CSFs of the computer industry are choice of the market niche, technological leadership, orderly product development, service and stability, and attraction/retention of quality personnel (6:25). This industry is relatively new and ever changing. Some firms have not kept up with certain factors and have had to withdraw from the market from lack of sales. It is extremely important, as evident from these examples, that CSFs can determine the success of a firm in its industry.

Comments. Critical success factors can be an effective aid in the management of organizations. The CSF method enables managers and organizations to define their information needs, and provides the needed direction for MIS planners to produce the correct information for the executives.

There is very little documentation on the subject of either CSF in theory or CSFs having been applied. This is

probably because the CSF method is relatively new and only a few universities are teaching or researching with this particular method. It is possible that the subject of CSFs will be discussed more frequently in the literature as more cases of application are documented.

Relationship Between Literature and the Problem

The literature review presented in the background discussion shows that the CSF method has been used in many commercial organizations, but has yet to be applied to the DoD. This is somewhat surprising since both commercial and DoD organizations require that information flow from the lower levels to the higher levels of the organization. Since the CSF Method has proved to be an effective solution for determining the information needs of high level managers in commercial organizations, CSFs could prove to be a solution for determining the information needs of DoD managers as well.

Justification

There have been many approaches to solving the information woes of managers that have been mentioned in the previous sections. The CSF approach has been developed to define the critical information needs of those responsible for the operation of the organization. The Sloan School of Management has demonstrated the usefulness and successful application of CSFs in many management situations. The various reports found in literature described earlier have shown positive results of the CSF applications involving many

different industry types and a variety of organizational factors. The adaptability to any organization's circumstances is one forte of the CSF method. Although it has not been applied to a DoD organization, the strengths and areas of focus of CSFs are well suited to any DoD situation as well.

Objective

As stated before, it appears the CSF method has not been applied to a DoD organization. Yet, with the importance of national defense, effective use of taxpayers' money, and the voluminous amount of data and reports, required or not, for the day to day activities of the military's managers, it is imperitive to equip these managers with an effective and efficient way of accomplishing their job. The means by which this is done should not require much time or resources, so that the potential benefits of employing the CSF concept are not outweighed by the costs used to implement them. The CSF method can do just that, as it has already shown the managers of other industry types how to perform more effectively and efficiently.

The objective of this proposed method is to determine whether or not the CSF method will work in a DoD environment. This application to FTD will be the first attempt to find out the applicability of CSF to a DoD organization in this manner. From the results, if successful, generalized recommendations of applying CSFs to all suited DoD organizations will be made. The ultimate desire is to reveal

the opportunity of reducing the plethora of paperwork and wasted efforts of all military managers, so that they may use the little time available to them, in the pursuit of the orderly accomplishment of their jobs.

II. Methodology

In order to accomplish the objective of this thesis, as described in Chapter I, an iterative process must take place. This process is comprised of interviews followed by analyses of the interview results.

Overview of CSF Method

The CSF method involved an iterative process that includes:

1. An individual interview with the top managers of the organization. This group of managers is comprised of the commander and the directorate chiefs of the organization. From these interviews, the broad spectrum of information requirements will be established. These information requirements will be in the form of each managers CSFs.

2. The information from step 1 is analyzed for common requirements among managers, as well as unique information requirements of the managers. These information requirements are combined into related groups, and assigned a priority based on frequency of use and on the managers' expressed needs.

3. Follow-up interviews are conducted with the same managers from the initial interviews. The first cut CSF set derived from steps 1 and 2 are presented to these managers. During these follow-up interviews, additional information is gathered for requirements not revealed in the first interview.

4. The information requirements from step 3 are finalized into the organization's and individual manager's critical success factors.

5. The findings are reported to the managers involved. This report is for their use and submittal to the MIS managers for implementation/modifications of the organization's MIS as required.

The CSF process as described above is provided only as an overview of the process. The actual process as applied to FTD is described in more detail in Chapters III and IV.

Particular Method

The CSF method uses personal interviews for determining a manager's or organization's CSFs. This interview technique uses a nonprobabilistic purposive sampling technique, and follows a structured format utilizing open-ended questions.

The basic interview technique has some advantages and disadvantages as discussed by Bailey (3):

Advantages of the interview technique

(1) flexibility: interviewer can probe for more specific answers,
(2) control over environment: interviewer can standardize the environment and ensure the respondent has privacy,
(3) spontaneity,
(4) respondent alone answers questions - not his staff,
(5) completeness: interviewer can ensure all questions are answered completely,
(6) greater complexity of questions allowed.

Disadvantages of the interview technique

(1) Cost,
(2) Time,

(3) Interview bias: interviewer can cause error by misunderstanding the respondents answer or by making a clerical error,
(4) No opportunity for interviewee to consult records. (3:157-159)

As stated earlier, the CSF interview method uses a nonprobabilistic purposive sampling technique. Nonprobabilistic sampling uses nonrandom sampling. This means that the sample may not be truly representative of the total population. The reason nonprobability sampling is used in the CSF method is that only certain individuals are selected for interviewing. A probabilistic sample would not select the individuals to be interviewed to obtain a random sample. Therefore, in the case of the CSF method, since the interviewers need to control who is interviewed, there is no desire to randomly interview individuals within the organization.

Again, the fact that only certain individuals are interviewed requires the CSF method to use a purposive sampling technique. A purposive sample is one that involves a "deliberate effort to secure a sample that conforms to some predetermined criteria" (10:177). The criteria used in the CSF method is that the interviewees selected are the organization's top executives. For example, if the CSFs for an organization are desired, the sample consists of those individuals who are in the best position to provide the necessary information, that being the top executives.

A structured interview format is used to provide consistent interview results. This facilitates the analysis

of the interview results and assures that all of the questions are asked at every interview in the same order. The structure of the CSF interview used at FTD is described in Chapter III.

The CSF structured interview format utilizes open-ended interview questions. "Open-ended questions are used for the more complex questions that cannot be answered in a few simple catagories but require more detail and discussion" (3:107). Open-ended questions allow the respondent to provide his thoughts and feelings concerning the topic in question. Bailey (3) provides the following concerning open-ended interview questions:

Advantages

(1) are used when the interviewer wants to hear the respondents view on a particular subject,
(2) allows respondents to answer adequately, in as much detail as desired,
(3) are preferrable on complex issues,
(4) allow the respondent to be creative and provide a response in their own context.

Disadvantages

(1) provides a collection of worthless or irrelevant information,
(2) response is not standardized making comparison more difficult,
(3) require superior writing skills since the interviewer may have to transcribe a lengthy statement. (3:106-107,172)

As will become evident later, for the CSF method, the advantages of open-ended questions heavily outweigh their disadvantages.

The open-ended interview questions that are used in the CSF process initially focus on the broad scope of managers'

roles in the organization, and progressively get more narrow in scope to reveal the more detailed information requirements. In fact, these same basic set of questions can be used regardless of the type of organization being dealt with. However, it takes more than just a list of questions to determine an individual's or organization's CSFs, the more detailed and revealing information relationships can only be collected from an understanding of the organization and from skillful interview techniques.

The basic open-ended interview questions and related areas that were used in the initial interviews at FTD, as adapted from Bullen and Rockarts "A Primer on Critical Success Factors" (6) are as follows:

Mission: Describe the key missions for your organization.

Role in Mission: Describe your role in accomplishing each of these missions.

Goals and specific targets to be reached at a particular point in time: For each mission and role, what are your specific goals?

Measuring goal attainment: How do you determine whether you have attained each goal?

Critical goals of individual managers: List the key areas where failure to perform would most adversely affect your organization.

Two additional questions helping to refine most critical goals: In which area would you most hate to see something go

wrong and, Suppose you have just returned to your job after 30 days of leave or absence; what would you first want to know? What next? (6:45-60)

The way that these open ended questions are utilized during the interview process for developing CSFs is described in Chapter III.

The use of these open-ended interview questions can require the use of probing questions. The probing question or follow-up question is used in order to have the respondent explain an answer more fully. The probing question is also used to ensure that the topic area the open-ended question addressed is covered in sufficient detail. Examples of probes as provided by Bailey (3) are:

1. *Repeating the question.* This is done whenever the respondent hesitates or appears not to understand the question. With lengthy questions it is often necessary to repeat two or three times before the respondent has it clearly enough in mind to begin concentrating upon an answer.
2. *Repeating the answer.* This type of neutral probe can be used by the interviewer who is not certain that he or she understood the respondent's answer correctly. Repetition of the answer can correct errors and assure both respondent and interviewer that the answer is recorded correctly. Repetition also gives the respondent an opportunity to think about elaborating it further.
3. *Indicating understanding and interest.* The *Interviewer's Manual* (University of Michigan 1969) recommends that the interviewer indicate that he or she heard the answer and approves of it, thus stimulating the respondent to continue.
4. *Pause.* The *Manual* also recommends that the interviewer pause and say nothing if the response is obviously incomplete. This indicates that the interviewer knows the respondent has begun to answer and is waiting for him or her to finish.
5. *A neutral question or comment.* "How do you

> mean that?" or "Tell me more" indicate to the respondent that his or her answer is on the right track but that more information is desired. (3:173)

The probing question should be as neutral as possible in order to avoid biasing the respondent's reply. Probing questions that can cause problems are double barrelled questions, ambiguous questions and leading questions.

The double barrelled question is two questions in one, and should be avoided when asking probing questions. It can be identified when the words "or" and "and" are contained in the question (3:97). When the double barrelled question is used as a probing question, the respondent may become confused as to which question to answer. The respondent may try to answer one or both questions when the interviewer is actually expecting the opposite response.

Another type of probing question to avoid is one that uses ambiguous words or phrases. The use of ambiguously worded questions can cause the respondent to interpret what the questions are asking and possibly answer the question in that light. To avoid ambiguity the interviewer should pick his words carefully, avoiding slang words and phrases. In addition, the interviewer should assure himself that the respondent clearly understands the question when it is asked. This can be done by watching for a puzzeled look in the respondents expression.

Neither the double barrelled question nor the ambiguous question have much of an effect on the outcome of the interview. They both tend to cause the respondent to attempt

to answer more than one question at once, but this can be corrected by seperating or rewording the questions.

A more serious problem that can possibly occur while using probing questions is biasing the respondent by using leading questions. Leading questions are those that attempt to artificially increase the probability of a particular response (3:102). The use of leading questions can be a conscious or unconscious act to try to get the respondent to answer in a certain way. In either case, the leading question plants a thought in the respondent's mind that might not have been there before. When this happens the respondent is biased and his response may be different than if the leading question had not been used.

The biasing that can occur due to the use of leading questions is due to something known as anchoring. Anchoring occurs when the respondent has an initial response and keeps adjusting that response until the final answer is provided (24:185). It is similar to the movement of a boat when it is anchored. Once the anchor is placed the boat can only move as far as the anchor allows. In a similar manner, the respondent can be tied to the original thought. Depending on the initial placement of the anchor, the final answer can be fairly close to the respondents true belief or extremely different.

As mentioned earlier, the CSF method requires the use of open-ended interview questions to acquire the necessary information from managers to determine their CSFs. In addition, open-ended questions often require the use of

probing questions to fully understand the managers response. The interviewer should attempt to use as neutral a probing question as possible to avoid the problems discussed earlier.

Summary

An iterative personal interview approach is used for determining top managers' Critical Success Factors. These interviews utilize open-ended questions set in a structured format to bring out the managers' information requirements. Due to the nature of open-ended questions, it is often necessary to use probing questions to follow-up or clarify the respondent's answer. The probing questions used must be as neutral as possible in order to avoid biasing the respondent.

III. Data Gathering

Introduction

The following descriptions are adaptations of the CSF Primer (6), but tailored to the specifics of a DoD type of organization. The preparation, preliminaries, and actual interview descriptions are listed in order of desired occurrence, and felt to be applicable to a wide variety of DoD organizational situations. Each of these subsections are followed by an example from applying the CSF method to FTD. As will be explained in the summary and conclusions (Chapter V), slight variations of the interview process can and should occur in order to adapt to the peculiarities of the organization in question. This will allow maximum effectiveness of the interview and overall receptiveness of the CSF methodology.

As mentioned before, the method of applying the CSF technique is the interview process. In order to accomplish the objective of determining the CSFs for an organization, the interview must be conducted so as to take very little time from the manager being interviewed while extracting all the relevant data needed. The success of applying CSFs can hinge on the success of the interview. However, the success will also hinge on the support of the top executives in the application of the CSF methodology. A step by step procedure is provided below which is designed to circumvent many potential problems and accomplish the objective of determining an organization's CSFs. Note the emphasis of

this thesis is on a DoD organization, which can be in reference to an office, SPO, division, and others. For the purpose of this thesis, the "organization" is the basic reference used, and is meant to be applied to any DoD organizational entity.

Organizational Details

Before embarking on a campaign to "sell" the idea of the CSF method to an organization, the interviewers should know the organization; that is knowing how the entire business operations are conducted currently in that organization (6:46-47). It is recommended that a team of 2 or 3 interviewers be used; the advantage of this will be discussed later. This can be done by research of the organization through its information pamphlets, brochures and other publically available sources which detail the missions, organizational structure, key personnel, corporate plans, and similar descriptive information. The information gathered from these published sources may or may not provide enough detail needed to properly understand the crucial activities that occur at the higher echelons of the organization. Other details can be obtained from a briefing by someone within the organization knowledgable of these activities. This can even be from one of those in charge of the IS development.

Applying CSFs to an organization can be an attractive management aid if it is presented to the executive level properly. Once enough details about the organization are gathered by the interview team, it may be necessary to "sell

the CSF methods to the upper management. It is imperative to get top level support to insure at least adequate implementation of an information system. Without top level support, lower level managers may not feel implored to give so freely of their time or effort in allowing the CSF methodology to be pursued. Top level executive support includes not only portrayal of enthusiasm and direction to the immediate directorate level chiefs, but a willingness to dedicate an adequate portion of the budget to the exploration, definition, development and implementation of the IS. An important aspect of the CSF method is that it can define the IS needs quickly, at little time expense to the managers involved, and with relatively small dollar amounts. The little expenditure of funds and effort up front, when done right, can not only save many dollars later on for defining the right system, but can elicit higher level use, and therefore success, which results from defining the individual manager's particular needs.

Next, the top executives should be made aware of the intent of CSFs and the benefits derived from the CSF approach. This can be done with the help of the organization's IS sponsors. Initially, a letter stating the desireability and potential benefits of CSFs should be sent to the upper management, and then followed by an optional briefing. Depending on the nature of these individuals, a briefing may be the desired approach to discuss the approach and benefits of CSFs, and allow time for questions about the method. This requires a thorough knowledge of the CSF

process as well as confidence in the ability of the interviewer to conduct a meaningful interview. The development of the interview skills required is described next.

Before going on however, the events to this point of the CSF method that occurred in the FTD experience will help show the potential flexibility of the CSF process in its ability to adapt to any situation that an organization might offer.

FTD Experience

The Foreign Technology Division (FTD) established an MIS formulation group tasked to study the existing IS situation that had been in use for a number of years, and now proved inadequate in many ways. That MIS group was briefed on the CSF method, its benefits and stressed the importance of getting top level support. An example of the briefing charts are contained in Appendix A.

The MIS group proceeded then to develop their own version of that briefing, and presented it to the commander. This was done to present the information in the most accommodating way. The CSF method was welcomed as having the possiblity of alleviating the MIS woes that many organizations experience, that being the organization trying to accommodate an MIS instead of the MIS accommodating the organization. The MIS team then conducted a briefing for the benefit of the interview team, giving further details of the FTD mission, and how each directorate and division fit into the organization to accomplish their individual objectives

and overall mission. In the remaining sections of this thesis, those managers interviewed will be referred to by the office symbol or office title shown in Figure 1 below. The organizational chart for FTD is shown in Figure 2. The top managers selected to be interviewed are shown in more detail in Figure 3.

CC	Commander
CV	Vice Commander
XO	Directorate of Plans and Operations
SD	Directorate of Systems
TQ	Directorate of Technology and Threat
SQ	Directorate of Sensor Data
SU	Directorate of Administration and Support
NI	Directorate of Data Services
SP	Security Office

Figure 1. FTD Office Symbols/Titles

The FTD commander in giving his full support, carried that expentancy of support over to the directorate chiefs, which gave an overall air of acceptance. Once the individual managers realized that they will actually get something useful out of this effort, the entire CSF application proceeded very well.

Interview Preparation

A go-ahead to apply CSF should be followed by a transmittal letter sent to the top managers of the

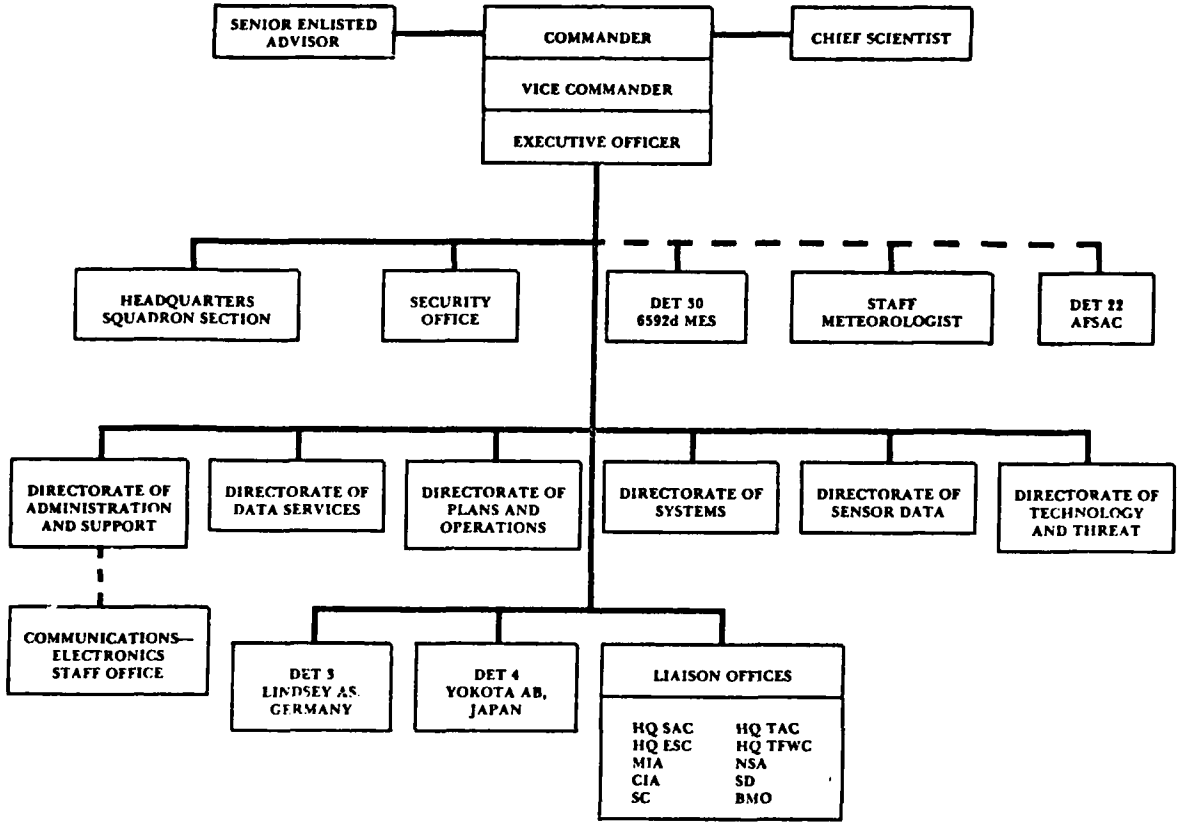


Figure 2. FTD Organizational Chart

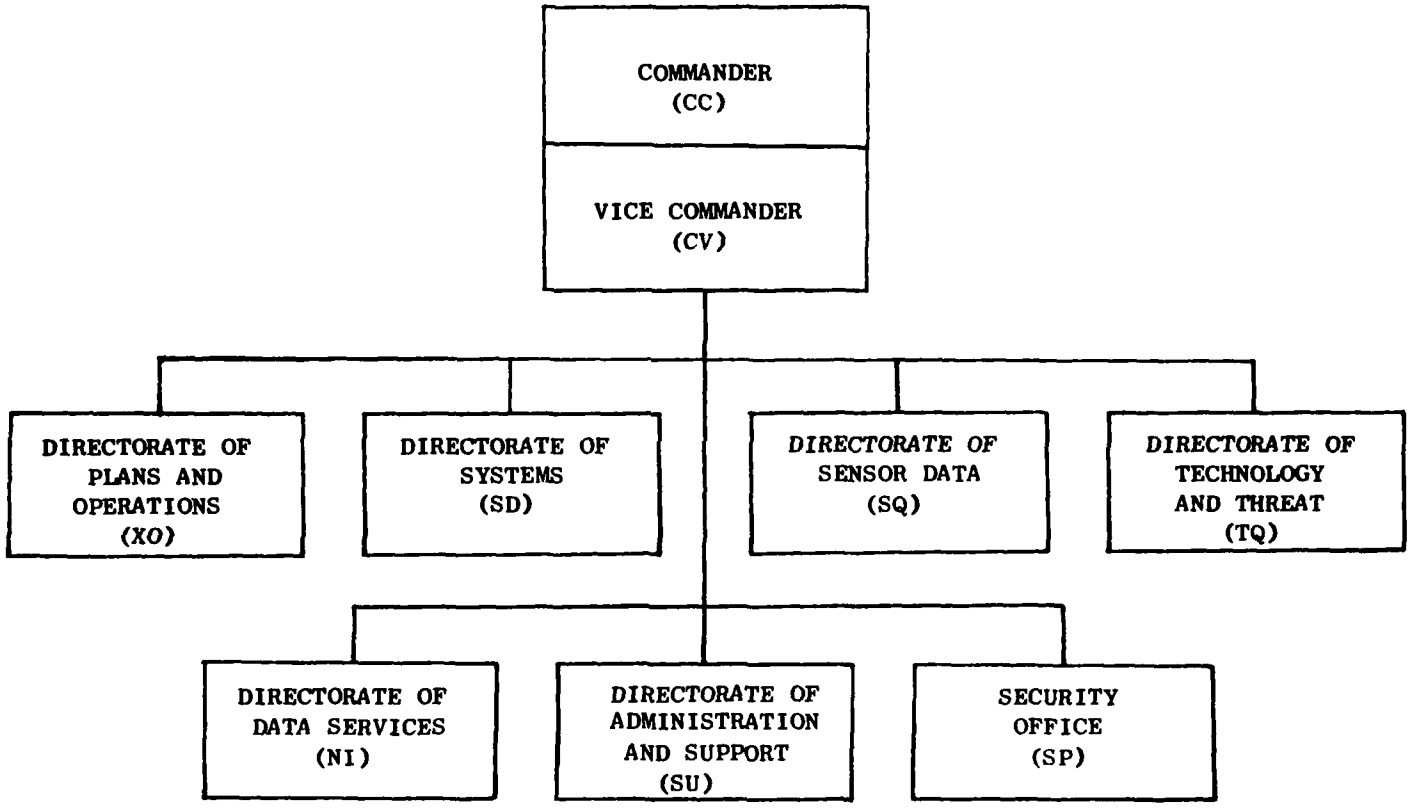


Figure 3. Managerial Chart of Interviewees

organization selected for the CSF application announcing the CSF effort's schedule and acknowledging who will be participating in the effort (6:47-48). These managers include all of those at the top level(s) deemed necessary by the MIS support group and the commander. The letter should indicate the indorsement of the organization's commander, or even be written for his/her signature. The letter should also go on to explain the purpose of the CSF method, the intent of the interview and a brief outline of the interview proceedings. Depending on the flexibility/availability of the managers to be interviewed a tentative schedule could be established. Schedule no more than three interviews per day to avoid burn-out of the interview team, and include other possible blocks of time in which the team is available to handle the probable schedule changes. It is recommended that the lower level managers be interviewed first. "This provides the ability to review, in preparation for interviews with higher-level managers, the knowledge gained from the CSF interviews of managers at lower levels" (6:48). This also allows the interviewer's confidence level to increase before the top manager(s) interviews are conducted, which invariably carry a larger share of importance. In addition, lower level managers typically have more structured responsibilities than the chief executive, and this also makes it easier to define their CSFs.

In order to avoid possible confusion during the interview and minimize distractions to the interviewee, and

thereby reduce the effectiveness of the attention given to the interviewee, only the individual of management position should be allowed to participate. The well intended help from within that manager's organization (even the manager's closest aid) might actually be self-defeating, and reduce the effectiveness of the interview.

The interviewee will benefit from any background material available on CSFs such as "Chief Executives Define Their Own data Needs" (20) and could be an attachment to the letter. They should be asked to be ready for the interview by being familiar with this material. They should also be cautioned to not pre-determine what their CSFs are, but simply be able to answer questions dealing specifically with the managers pervue. Definitions of mission, objective, goals and other important terms should be included, as well as terms that may have slightly different meanings from individual to individual. A sample letter is included in Appendix B. The attachment to that letter includes a listing of the tentative interview schedule and important CSF related definitions. One additional item in the letter is to indicate not only who is participating from the CSF interview team and MIS group, but when the interviews are scheduled and where the interviews will be held. This should be a location of neutrallity, not in the interviewee's office if it can be avoided. The surroundings should not be distracting so as to reduce the effectiveness of the interview. If this neutral area is not possible, whatever can be done to minimize distractions (phone calls, meetings, hallway traffic and the

like) should be done.

The sooner the interviews are initiated, the less time and chance of the willingness of support from these managers to wane. The first two to three interviews can be critical to the remaining interviewees' responsiveness, since those interviewed will most likely inform the remaining managers to be interviewed how the interviews so far have turned out. Therefore, the interviewer techniques must be polished and professional, or else the effectiveness of the CSF application can be reduced dramatically. Before the actual interviews are conducted, it is highly recommended that the inteview questions and procedures be practiced, preferably with one or two of the organization's MIS sponsor members. This not only will add confidence to the interviewer, but it will give the MIS group an opportunity to make helpful suggestions on how to approach the organization's managers, and how to deal with personalities and individual characteristics. This will help maximize the effectiveness of the interview, and also allow the organization's MIS group to become familiar with the CSF interview process for future applications within the organization. This can be a large benefit since inevitable organizational changes in personnel, structure, or changes in industry can cause information needs to change, but these changes can be accommodated by updating the CSFs of the managers. The procedure is the same for the practice interviews as with the real interviews, and the practice interviews should be treated just as critical in

order to learn how to adjust to unanticipated responses, attitudes, personalities and such variables.

The importance of the interview cannot be overstressed. The willingness of the interviewee to reveal the lifeblood of his/her immediate responsibilities is the essence of the CSF method which cannot afford the results of an ineffective/ unaccomplished interview. The interview mechanics reviewed in Chapter II describe the various factors to be aware of. Bullard suggests that "from all acquired knowledge, [of the managers, list his/her] probable objectives, goals, CSF's and measures" (6:49). This last step should round out the interview preparation.

The FTD example of scheduling had to remain flexible. Initially the directors were notified by letter, after having been briefed of the tentative schedule. All managers involved were at the directorate level, so the first interviews were scheduled with the more operational side of FTD, support directorates were next, and all were followed by the commander. Availability of these managers was exceptional, but unforseen circumstances dictated the allowance for alternate days, and the schedule did change to accommodate the circumstances.

The interview schedule was established to start 2 weeks from the briefing to the MIS group so as to allow adequate time to prepare for the interviews, which included practice interviews that would help tailor the procedure to best accommodate the intricacies of the FTD organization.

One member of the MIS team of FTD was always scheduled

to be present during the interviews. This proved to be an asset for making initial introductions, and helped establish quidelines of security, provide refreshments and other needs as they arose.

Interview Preliminaries

The interview should begin by brief name introductions (preferably by the MIS group attendee) of the participants to add to the informal atmosphere that is desired. Once seated and ready, remind the interviewee of the agenda, purpose, and nature of the interview. If the interviews are being conducted by a team of 2 or 3 members, the main interviewer should sit in a vantage point where the interviewee is comfortably close, as well as having relatively easy visibility to at least one member of the interview team. The reason for this will become evident as discussed later. The definitions of CSFs objectives, goals and measures must be well understood by the interviewee, so it is advisable to revisit them at this point to insure that they are (6:50-52). It should help to give the interviewer another copy of the attachments prior to the interview for reference during the interview in the event there is still a tendancy to confuse the terms. This attachment (or point paper) should not be verbose, but a concise, understandable listing of terms, definitions and intents. An example is provided in the attachment to the transmittal letter in Appendix B.

The length of verbal introduction to the interview that is necessary to clearly describe this point paper is

dependent on the interviewee's knowledge of CSFs as provided in the material contained in the transmittal letter (6:50-52). These points do not need to be reviewed in detail, however they do need to be understood before going on. More time will be required in the event that the manager has not reviewed the material as requested.

The FTD example of interview preliminaries used the appropriate interview suggestions as explained in the CSF Primer (6) and adapted these to the situation anticipated in the FTD organization. The interview point paper in Appendix B was the guideline developed for that purpose. The point of reviewing the objective and purpose of the interview includes an explanation of what the CSFs are and why the CSF method is being used. This will help set the stage for eliciting cooperation from the manager. The fact is reiterated to the manager that the results of this study will result in an IS designed to help him/her do their job, and is specifically tailored to their needs. This futher reinforces the impetus for the manager to be very helpful and open to questions that will follow.

This review of the interviewer's objective and interview process is followed by a statement about the informal nature of the interview. Although the interview is structured, any thoughts on the managers mind relevant to the issues being pursued must be aired unhindered so as to insure the maximum potential for a successful interview.

Our interview sessions required two hours with each

interviewee. Each interviewee was expected to be devoted to the full two hours in the event the full amount of time was needed. A manager that has his/her attention focused on getting back to the job or some other engagement will not be fully effective in identifying those critical areas being sought in the interview. We believe that two hours is representative of the time required to successfully complete an interview.

Finally, before proceeding directly into the interview itself, the Key Definitions are once again reviewed. It was not uncommon for goals and objectives to have alternate meanings or different emphasis than that listed in the point paper. It is necessary to remain consistent with these definitions adapted for the interview in order to allow organization-wide consistency, and allow a meaningful follow-on analysis of the results.

Interview

As with the point paper, the questions that follow should be on a summary paper to allow smooth continuity of the interview. An example of the Question-Summary paper is included in Figure 4. An important aspect of the interview is for the interviewer to maintain eye contact and portraying interest in what the interviewee is saying. Therefore this question-summary paper should not be a crutch to the interviewer absorbing undue attention from the interviewer, but should be used only as an aid. After each question, some inconspicuous marker (e.g. a paperclip, coffee cup) can be

used to provide an easy eye reference when needed. After each question is asked, summarize the answer to ensure that the interviewer understands the interviewee response. The worksheet that was used at FTD is in Figure 5.

- Please describe the key missions for your organization
  - ··Summarize missions
- Please describe your role in accomplishing each of these missions.
  - ··Summarize missions & roles
- For each mission and role, whate are your specific goals?
  - ··Are there any goals not related to specific mission and role?
  - ··Summarize
- For each stated goal, how do you determine whether you have attained the goal?
- Please list the key areas where failure to perform would most adversely affect your organization
  - ··In which area would you most hate to see something go wrong?
  - ··Suppose you have just returned to your job after 30 days leave of absence; what would you first want to know? What next?
  - ··Summarize and prioritize CSFs.
- For each of these critical success factors:
  - ··What would be the ideal measure?
  - ··What type of information is currently available to support these measures?
- Finally, from your perspective, what are the Commanders' critical success factors?

Figure 4. Interview Question/Summary Sheet

The Worksheet is more useful if it is legal size paper turned sideways as depicted in Figure 5 below. The area immediately below the Missions/Roles/Goals/Measurement work area is for responses to the CSF prioritization questions and other notes as needed during the interview.

Missions	Roles	Goals	Measurement
Work Area/ Question Responses			

Figure 5. Interview Response Worksheet

The interviewer can have a partner or team responsible for capturing the details of the interview, and act as a back-up to the interviewer when a snag is reached. This is where clever signals between the prime interviewer and the other team members may prove helpful. When any problem occurs that requires continued attention from the interview team such as interviewer memory lapse, a stagnant moment or similar situations that distract from the interview, the indiscreet request for help can allow the interview to get quickly back on course. Other examples of back-up can be asking for

clarification of a point made by the interviewee, help in clarifying a point made by the interviewer by using alternate phrasing or an example, or as an aid in the summarizing of each question's response before moving on to the next question. In fact, it is possible to alternate roles of interviewer, or roles of asking questions and role of summarizing responses between the team members. This can be done at the discretion of the interview team when it is thought to be an acceptable method. This will vary from one interview team and organization to another.

The interview proceeds on into the structured section by first asking the manager to describe the key missions of that manager's part of the organization (6:52-53). The primer points out two benefits of this:

> First, it is an easy way to get the interviewee into the process and to start him talking. He is asked to discuss that which he knows best, his company and his job. Second, however, as the manager discusses his job, he almost always provides clues as to how he "views the world". Is he strategically oriented? Does he view his job as one which is set up to induce change into the organization, or is he a "caretaker" put in the job to carry out the routines which have been developed by past managers? (6:52)

Again, remember to allow sufficient time for the interviewee to answer, and keep the interviewer on the subject as much as possible. Redirect the question and clarify it if the response is not in line with the intent of the question. If the response to the mission question is simply the organization's published version of the mission, stress the fact that the question is addressing how he/she personally views his/her mission. Once the mission or

missions are established, summarize them for the manager and make sure that this agrees with what he/she intended to say, and make sure there are no other missions left uncovered before going on to the next topic.

Next, have the manager describe his/her role in accomplishing these missions (6:52-53). It is helpful to address one mission at a time, repeating the question for each mission area to elicit the manager's role in that mission. Role in this context is "what does the manager do?" or "what is the manager's job?".

The same interviewer rules apply here and throughout the interview. Suggest possible areas to help the manager answer a question when it seems hard for the manager to grasp an idea. However, don't lead the interviewee, or put words in his/her mouth, but from the interviewer's insight and experience, make a suggestion which can spark a useful thought on the subject.

At this point in time it will become more and more evident to the interview team as to the nature of the job of the manager. Suggestions and clarifications can be tempered to follow this line of reasoning. Is the manager involved in personnel related activities, or support, or operational activities? The more interviews conducted, the easier it is to conduct an effective and efficient interview.

Once the first mission has been addressed, move on to the next mission. If the role is complex, it is suggested to review that role or roles of that mission before moving on to

the next mission's role. If the responses are fairly simple, move on to the next mission's role, in succession, until they are all covered adequately. Then, once this has been done, a brief summarization of roles is recommended to prepare the interviewee for further detailing of the subject.

At this point, a close eye on time should indicate the progress of the interview. Depending on the complexity of roles and manager's job knowledge, 45 minutes to 1 hour should have been used to cover the missions and roles. More time than this will probably mean an extended interview or follow-up session to cover the crucial areas of the interview. However, this is not a hard and fast rule, but a good indicator from which the remainder of the interview must be determined. This will be discussed after the next area of the interview; the goals.

In a similar manner as with the roles, ask the manager to describe the specific goals that he/she has for each role (6:53-54). If it is necessary to clarify again the distinction between goals and objectives, do so here. Goals are specific targets or efforts that have a specific time span or completion date associated with them. The time horizon for these goals can be that which is most meaningful for him/her (6:53). "Most managers pick a one-year horizon; some provide both long and short term goals. The choice of the time-span and nature of the goals selected are meaningful in itself since they provide further insight into the way the manager views his job" (6:53).

Some managers will have goals that are not formally

associated with the role of the manager, but one that is a more personal goal. An example of this is "the elevation of [the manager's] sub-organization higher in the company to give it (and him) more power" (6:54). Since both the formal goals (those associated with specific roles) and informal goals (such as those just mentioned) are used to derive the CSFs, it can be seen in developing the manager's CSFs that "these unstated -- yet very important -- informal goals [are] highly useful where possible to bring these goals to the surface" (6:54). Once these formal and informal goals are listed and discussed, they too are summarized.

The next steps of the interview process are designed to develop the CSFs from the manager's goals (6:54-58). Included are not only the prioritizations of the goals and some assessment of the criticality of each one, but an attempt at determining the best measure for each of the goals. The means of measurement are extremely useful for the IS development phase which immediately follows the CSF application, and helps determine the structure of the data base and of the IS.

In determining measures for the goals, it is recommended that the interview be structured to reserve these questions for last, and if time left in the terview is short, these questions can be saved for the second interview. So, "determining measures [by asking measure - related questions] does not need to be carried out during the initial CSF interview" (6:59). Nonetheless, the process of determining

measures is described here, but the interview schedule used is left to the discretion of the interviewer.

The first question asked that is useful in achieving measures is, "For each stated goal, how do you determine whether the goal has been attained or not?" Many goals will be more subjective in nature and difficult to assess. One example of a subjective measure very common at FTD is their requirement for good interpersonal relationships. This goal helped virtually the entire organization operate more efficiently to some degree, unfortunately, as critical as it is, there are no convenient or quantifiable measures for it. There may be attempts made at quantifying this, but in contrast to a delivery schedule which is easily measured, interpersonal relationships are not easily measured. However, these types of measures that must be considered, directly or indirectly, and means of measurement will require imagination on the part of the interviewer and the interviewee.

This measurement discussion during the interview and the other measuring related questions that follow can be slightly less structured. This means that some measures may be difficult to determine, but "there is no danger of 'leading' here. The interviewer may suggest means of measurment that the interviewee did not think of but likes and will use" (6:59).

Once these goal attainments are discussed, the next area of discussion will prioritize the goals and will determine the degree to which they are really important (6:58-59). The

reasoning of this questioning is to force the manager to think differently about these goals, but are "highly effective in assisting managers to zero in on the few most critical areas of their responsibility" (6:55).

The initial question is "which of the key areas would be most adversely affected from a failure to perform them?" This obviously has the manager review his/her organization again to label those areas that must be done in order to keep the organization running. This in effect weeds out non-critical goals, and places emphasis on those that will now be called CSFs.

The next question attempts to prioritize the more important of the CSFs and put it on the top of the list. It is "In which area would you most hate to see something go wrong?" Some managers may place two CSFs there, and this is acceptable, since equal priority CSFs will receive equal attention when the actual IS development is performed. The idea is to find those factors that are most critical to the manager and which will be those areas that truly require the support from the IS.

This same question is then asked in a more thought provoking way as, "Suppose you have just returned to your job after 30 days of leave or absence; what would you first want to know? What Next?" The manager may say that that long an absence would never happen, but again, the idea is to be realistic in assessing the function and goals of the organization. Discussion may include reasoning why these are

thought of as important, which helps the manager justify to him/herself as well as to the interviewer why this is so. The list of CSFs at this point should be short and prioritized, and should be reviewed for the sake of the manager and to insure the CSFs are clearly understood by the interview team.

Measures of these CSFs are now attempted, or as mentioned before, attempted during the next interview (6:59-60). The first of these questions is "What would be the ideal measure for these CSFs?" Each CSF is addressed one at a time and may again require creative thinking for the more subjective factors. Follow this last discussion with "What type of information is currently available to support these measures?"

The answer to the last question along with the responses of the CSFs and their measures is the objective of CSF methodology. This information is what the MIS support group will now be able to use in developing the IS. Some things to do and remember while conducting this latter section of the interview when specifically addressing CSFs are:

1) In relation to the CSF classifications of temporal environmental, and so forth, "mentally check the list of CSFs to ensure the interviewee has not focused on only one type of CSF" (6:56). As an example, make sure that external factors are being considered as well as the immediate organizational factors, and thereby insuring that a complete assessment will be obtained.

2) "'Aggregate" CSFs to insure that one CSF is not

being discussed in multiple ways" (6:57). This is similar to the first point. Instead of making sure all CSF areas are being addressed, this aggregation checks to make sure one CSF isn't erroneously being addressed in these other CSF areas.

3) As described before, "check to ensure that all CSFs are being elicited, not only those that can be measured with hard data" (6:57).

One last question that is helpful when establishing an organization's set of CSFs, and determining where the organization's emphases are is "From your (the manager's) perspective, what are the Commander's CSFs?" From the first manager interviewed on, the pieces of the organization start falling together into a more complete picture with the manager's responses, as well as "arming" the interview team with great insights of the organization's purpose prior to interviewing the commander.

Once the first set of interviews is accomplished, usually with the commander being the last one, the interview team will need to review all of the data to make sure the team members are all in complete agreement on the CSF lists and meanings for each manager. These lists of CSFs are written in summary fashion, and any measures for them are included. This forms the basis of the second interview.

The second interview is very informal and simply a review of each manager's list of CSFs to make sure that what he/she meant to say is actually reflected in the team's summarized version. Any changes will be made at this time.

If the first interview did not allow for the determination of measures, this line of questioning is initiated or resumed, until each CSF has a form of measure.

Lastly, since some time has elapsed between this and the first interview, the manager may have additional thoughts on the missions, roles, goals, and CSFs, already discussed. This could be clarifying words, but more commonly are additional areas not covered before that have potential for being a CSF and/or measurement. These are appropriately discussed here until the manager and interviewer are satisfied with the results. This second interview usually culminates the CSF interview process, except in some cases for an additional short follow-up session only as needed before presenting the whole organization's matrix of CSFs and accompanying analysis. This is the topic of Chapter IV.

Summary

Using good interview techniques and instructions set forth thus far should prove very useful in applying the CSF methodology. The method is designed to cover the gamet of those things that are important to that manager at that particular time. This process can be repeated as the organization changes with its environment, or as managers change as is so common in the DoD Services.

This CSF method is also flexible to allow changes in questions that best draw out the managers thoughts. "The interviewer should be sure that he has 'stretched' the manager as far as possible in his thinking during the

interview" (6:58). This is where pursuing alternate vantage points might be necessary for giving the manager a clear grasp of the idea being pursued through the particular line of questioning. As is necessary for successful interviews "this is a situation in which one must be extremely sensitive to the problem of 'leading the witness'. The interviewer must walk the narrow line of eliciting information without creating the answers" (6:58). Additionally, the interview structure itself can be flexible to accommodate the length time of the interview and the personalities of the managers being interviewed. When all this is done, the interview team is ready for the analysis of the organization's set of CSFs.

IV. Data Analysis

The activity that follows the interview process is the data analysis phase. At this time the CSF interview team should have a list of prioritized CSFs for each manager interviewed. The list of CSFs should have been reviewed with the appropriate manager, and once final agreement is reached, the list represents that manager's current and complete CSFs. The analysis of the interview results should be accomplished as soon as possible after the completion of the interview sequence to avoid the possible loss of pertinent information.

The analysis phase of the CSF application allows the interview team to compare the CSFs of each manager in order to reveal similarities which might be caused by the management philosophy of the organization (6:61). In addition, the individual manager's CSFs can be reviewed to see if he/she is stressing one area of management under their control. At this point in the data analysis "it is highly desirable to prepare a written version of the CSFs to be reviewed and approved by the interviewee. In addition to ensuring the facts are correct, this step may elicit additional information" (6:61).

Once the interview team is assured that they have a reliable CSF list for each manager, they can now proceed in developing a matrix of the CSFs. This CSF matrix will provide the organization's information system planners with an idea of the data base(s) required to provide the necessary information from the top managers' CSFs.

In developing the CSF matrix it may be necessary to group and combine the individual managers CSFs. This is especially true if some of the managers have stated similar or related CSFs. However, the interview team should pay close attention to the grouping of CSFs so that uniquely different CSFs are not lost in the process.

The CSF matrix is constructed by listing the aggregated CSFs along the left side of the matrix and the managers interviewed listed along the top of the matrix. The matrix is then filled with each manager's individually prioritized ranking of CSFs listed on the matrix. It can be beneficial to organize the CSFs on the matrix by one of the four sources of CSFs as described in Chapter I, those of industry structure, strategy, environmental and temporal. Catagorizing the CSFs in this manner will assist the information system planners in designing the information data bases required to accommodate the information needs of the top managers. These catagories will also aid the top managers by allowing them to determine how they themselves are grouping their information needs and where each individual manager is placing emphasis on the overall set of information requirements. The resulting CSF matrix will be similar to the one depicted in Appendix C as adapted from Figure 12 of Bullen and Rockarts "A Primer on Critical Success Factors" (6:39-40).

The CSF matrix can now be briefed to the organization's top managers for their review.

FTD CSF Data Analysis

The analysis of the interview results from the interviews performed at FTD did not occur identically with the procedure described above. The main reason for the change in procedure was the limited time available to accomplish the entire CSF method at FTD. In fact, FTD requested the CSF method be applied to their organization with the constraint that the entire process be accomplished within 30 days. This forced the scheduling of the interviews of the top managers at FTD into a two week time period. The interviews were then performed over a two week period and due to the time schedule of the participants involved, the process was limited to only one interview per manager of no more that two hours in length. The limited amount of time allowed for these interviews forced them to end without the development of the interviewee's CSFs. From this fact, the CSFs for each manager had to be determined after the conclusion of this two week interview process.

The actual analysis of the data gathered from the FTD interviews started with comparison of the interview notes contained on the interview worksheet forms. An example of the interview worksheet for FTD/SQ is shown in Figure 6. The reason for starting the analysis with this comparison was to ensure that each interview team member had a complete and accurate list of the interviewees' response to the structured interview questions. This was accomplished by having one team member read the reponses outloud that he had written

Mission	Roles	Goals
1. Receipt and processing of data.	1. Review some (by exception). Determine resource allocation and determine priorities. Plan for new capabilities.	1. Anticipate problems further in advance and take corrective action. Better understand implications of Improve Productivity of organization through people and machine. Develop in house training for people. Keep job interesting for people.
2. Analyze data and convert to written graphic form.	2. Plan for new capabilities. Develop new techniques and tools. Mix of skills and training.	2. Upgrade equipment to state of the art. Earlier integration of multi sensor information.
3. Generate report on tasked items for use.	3. Involved in late reports and Management by exception. Periodic review to Commander.	3. Further automate the reporting process. Incorporate electronic mail.
4. Provide feedback to collection agency or provide specific target requests.	4. Coordination for new sensors etc.	4. Improve timelines of collection. More real time data.
5. Support Interagency working groups.	5. Coordination of meetings. Individual assignment for working groups.	5. Reduce the investment in meeting support. Assign most qualified individual.

Failure to perform would hurt most in:	Selecting the right manager for the job. Supervisory relationships between military and civilian. Internal resources available to support new system.
Would hate to see go wrong:	Working relationships of people in directorate with each other and with other FTD directorate.
After 30 day leave wants to know:	1st - status of operating equipment. 2nd - what has happened to funding and planning schedule activities.
Summary of main Goals:	Ensuring we have out year funding. Reducing the training time of new employees. Interagency coordination and information on joint procurement. Increase the productivity of generating reports.

Figure 6. Interview Worksheet from FTD/SQ Interview

down on his interview worksheet. By reading through each interviewee's responses from the interview, the other interview team members were given the opportunity to agree with, add to, or discuss a differing perception of what they had written on their own interview worksheet. This was an important step to start with since it happened on more than one occasion that one of the interviewers had misunderstood or even missed entirely what the interviewee had said in response to a question.

The process of going over each response on the interview worksheet ensured that not only was the analysis performed from a common set of data, but the most information as was possible had been extracted from the data gathered from each interview. This is important since time is typically a critical resource for top managers of an organization, so that the time they provided to the interviews had to be used as wisely and efficiently as possible. This was especially important in the FTD instance due to the extremely limited time available for interviews.

Following agreement on the contents of the interview worksheets, it was decided that each member of the interview team should individually attempt to categorize and build a matrix of CSFs. As an aid in categorizing the CSFs, it was noted that there were three main areas where the commander and directors of FTD seemed to all focus on, namely external, internal and human resources.

The interview team members then separately developed an

organizational CSF matrix. This separate CSF matrix development allows the team members to individually reflect on the interviews and bring out their own thoughts and views on the outcome of those interviews. The first step for this was to list the managers' goals that fit into each main catagory along the left side of the matrix. The next step was to list the individuals interviewed along the top of the matrix. The final step was to go through each interview worksheet and check off the appropriate intersection on the matrix where the managers specifically mentioned the goal.

The interview team then reassembled to jointly determine the CSF matrix for the FTD managers. The process followed then was to have one interview team member read through the list of CSFs under each of the three main areas and also say which directors he had checked for specifically mentioning that CSF. After the individual did this for one CSF the other team members provided feedback relating their ideas on what was presented as compared to the CSF matrix that they had developed. This process continued through the remaining areas until agreement was reached.

The interview team then looked at the interviewee's responses to three structured interview questions to determine the first and second area of concern changing the appropriate checks to a number 1 or 2. These three questions were:

1. List the key areas where failure to perform would

most adversely affect your organization?

2. In which area would you most hate to see something go wrong?

3. Suppose you have just returned to your job after 30 days of leave or absence, what would you first want to know, what next?

A portion of the resulting CSF matrix for FTD is shown in Figure 7. The entire CSF matrix is included in Appendix C. Note that there are items marked by "x", which will be discussed later. The first and second major areas of concern are denoted by an "(i)" and those items specifically mentioned by the manager are denoted by a "xx".

The interview team then presented the briefing on the CSF matrix to all the directors interviewed except for the commander. This allowed the directors to review their individual CSFs with only their peers in attendance, and performed as a replacement for the second interviews normally performed with the individual managers. This group approach of reviewing the CSFs was a result of the severe time limitation mentioned before. The preferred approach would still have been to review the CSF lists with the managers on an individual basis.

During this briefing, the directors were allowed to not only validate their CSFs, but were also given the opportunity to add any specific area not discussed in the prior interview process. The items that the managers added during this session are denoted by an "x" on the CSF matrix shown in

	Command		Production				Service		
Set of CSFs	CC	CV	XO	SD	TQ	SQ	SU	NI	SP
Productivity									
• Enhance Intra-Agency Cooperation			XX			XX			
•• Earlier Multi-Sensor Intergration									
•• Coordination on QRTs				X	X				
• Expand Use of Management Analysis			XX						
• Increase Automated Support	XX		XX			XX		XX	
•• Realtime Product Data Base (reduce paperwork)							X		
•• Of Analysis Process (modeling, tools, etc.)					X				
•• Of Report Preparation and Distribution				X	X		X		

Figure 7. CSF Matrix of FTD

Following the briefing to the directors the interview team briefed the results of the CSF process, including the CSF matrix, shown in Appendix C to the FTD commander as well as the directors and the management information group.

Summary

The data analysis phase of the CSF process begins with the CSF list developed for each manager during the personal interviews. Using these lists, the CSF interview team groups and combines similar CSFs to determine common information needs. These CSFs are then listed on a matrix along with the managers interviewed. The intersection of the CSFs and the managers specifically mentioning the CSFs is marked on the matrix. This matrix is then provided to the organization's management information group for incorporation into the organization's information system.

V. Summary and Recommendations

The preceding description of the CSF method and actual application to FTD encapsulate the currently available literature and techniques of application. The major focus of the CSF method is to provide a means of defining the organization's top managers information needs. From this information, the managers are then better equiped to make decisions that really affect the direction of the organization. These decisions have the potential to directly affect the success or failure of the operation of the firm.

The recognition of top management's information requirements attempts to be an improvement over other methods of Decision Support System (DDS) or Management Information Systems (MIS) that may only satisfy the higher detailed needs of lower level managers. These other systems tend to provide too much of these extraneous lower level details to top management from which upper management must then "weed" through large amounts of data to find the information that is really pertinent.

The CSF method uses the interview process to elicit these critical areas of concerns from upper management. This interview is structured in the sense that a format is used to guide the data gathering, and is flexible to allow for proper clarification or amplification as needed. From the hierarchy of questions directed at deriving those critical areas of concern to a manager, the CSFs are established. Those CSFs are then identified with a method in which measurement can be

quantified for use in a computerized data system. These CSFs and measures are the basis of the information system specialists' design and construction of the data base to be used in support of the top managers decision making.

The actual application of the CSF method to FTD was a first in that never before had this method been applied to a DoD organization. The concern was of the rigid non-profit structure that encompass DoD organizations that do not exist in non-DoD firms. FTD proved to be a prime candidate in its representativeness of that organization to most organizations within the DoD, and of their own recognition of the need for defining top management's information requirements for their crucial role in the world of global military intelligence.

The application of CSF proved very well received by the entire management, and very well suited to defining the information needs. The resulting CSF matrix of the FTD organization (Appendix C) is the information structure that is currently being used to design , develop and build the information system to be used at FTD. So successful was the CAF application that the method is now being internally administered to the lower levels of management from which the entire organization will be integrated from the information/ responsibility point of view.

Recommendations

The CSF method proved very applicable to the FTD

organization, and therefore any DoD organization would be a candidate for application. With the current emphasis by Air Force System Command as well as other commands to employ state-of-the-art computer and information system (IS) techniques, the time seems right to build an IS around the needs of the organization. The potential still exists to make the mistake of defining information needs around the computer instead of building the IS around the organization's needs. The CSF method has been proven very effective in both DoD and non-DoD applications. Therefore, it is recommended that, before an IS is built in the DoD, the CSF method be considered first for applicability in providing the critical information needs of the organization's upper level managers.

A follow-on thesis effort is suggested to cover:

1) A further application of the CSF method to a larger DoD organization, or even at Command level.

2) A formal "advertizement" of the CSF method at the command and/or Air Force level to be incorporated in all Air Force IS applications that warrant it.

PURPOSE OF CRITICAL SUCCESS FACTORS (CSF)

- TO AID AN ORGANIZATION IN ITS INFORMATION SYSTEMS PLANNING PROCESS

- TO AID AN ORGANIZATION IN ITS GENERAL PLANNING PROCESS (STRATEGIC, LONG RANGE, ANNUAL PLANNING)

- TO HELP AN INDIVIDUAL MANAGER DETERMINE HIS/HER INFORMATION NEEDS

WHAT ARE CSFs?

CRITICAL SUCCESS FACTORS ARE THE THREE TO SIX AREAS

WHERE SATISFACTORY RESULTS WILL ENSURE SUCCESSFUL

PERFORMANCE FOR THE INDIVIDUAL OR THE ORGANIZATION

EXAMPLE:

- 1961 CSFs OF THE AUTOMOBILE INDUSTRY
  - STYLING
  - QUALITY DEALER SYSTEM
  - COST CONTROL

- 1976/7
  - SAME THREE
  - PLUS MEETING ENVIRONMENTAL STANDARDS

- 1978
  - STYLING REMOVED FROM THE LIST
  - ADD "IMAGE" OF QUALITY AND FUEL EFFICIENCY

COMPUTER INDUSTRY EXAMPLE:

CURRENT CSFs ARE

- CHOICE OF MARKET NICHE
- TECHNOLOGICAL LEADERSHIP
- ORDERLY PRODUCT DEVELOPMENT
- SERVICE AND STABILITY
- ATTRACTION AND RETENTION OF QUALITY PERSONNEL

CSFs OF COMPUTER COMPANY	SOURCES OF CSFs
• MARKET UNDERSTANDING	• MARKET NICHE
• INSIGHTFUL COMPETITIVE ANALYSIS	• *MARKET NICHE*
• TECHNOLOGICAL LEADERSHIP	• TECHNOLOGICAL LEADERSHIP
• DEVELOPING AN IMAGE	• TEMPORAL CSF
• DEVELOPING A MORE EFFECTIVE CORPORATE MARKETING STAFF	• TEMPORAL CSF FROM COMPANY STRATEGY
• QUALITY PEOPLE	• ATTRATION AND RETENTION
• SERVICE AND STABILITY	• SERVICE

MAIN SOURCES OF CSFs:

- STRATEGIC FACTORS
- ENVIRONMENTAL FACTORS
  - FTD INTERFACE WITH HQ USAF, DOD, OTHER AGENCIES
- TEMPORAL FACTORS
  - TRANSIENT REQUIREMENTS
  - TEMPORARY NEEDS

HOW CSFs ARE APPLIED

- SERIES OF TWO OR THREE INTERVIEWS
  - TOP 10 TO 15 MANAGERS OF ORGANIZATION ARE IDENTIFIED
  - BEGIN INTERVIEWING AT LOWER LEVEL OF THE MANAGERS
  - WORKING UP TO HIGHEST LEVEL

- FIRST INTERVIEW
  - GOALS ARE DISCUSSED
  - CSFs UNDERLYING GOALS ARE IDENTIFIED
  - CSFs ARE ANALYZED

- SECOND INTERVIEW
  - RESULTS OF ANALYSIS ARE REVIEWED
  - ADDITIONAL FACTORS?CLARIFYING DISCUSSIONS

- THIRD - GROUP INTERVIEW
  - OBTAIN FINAL AGREEMENT

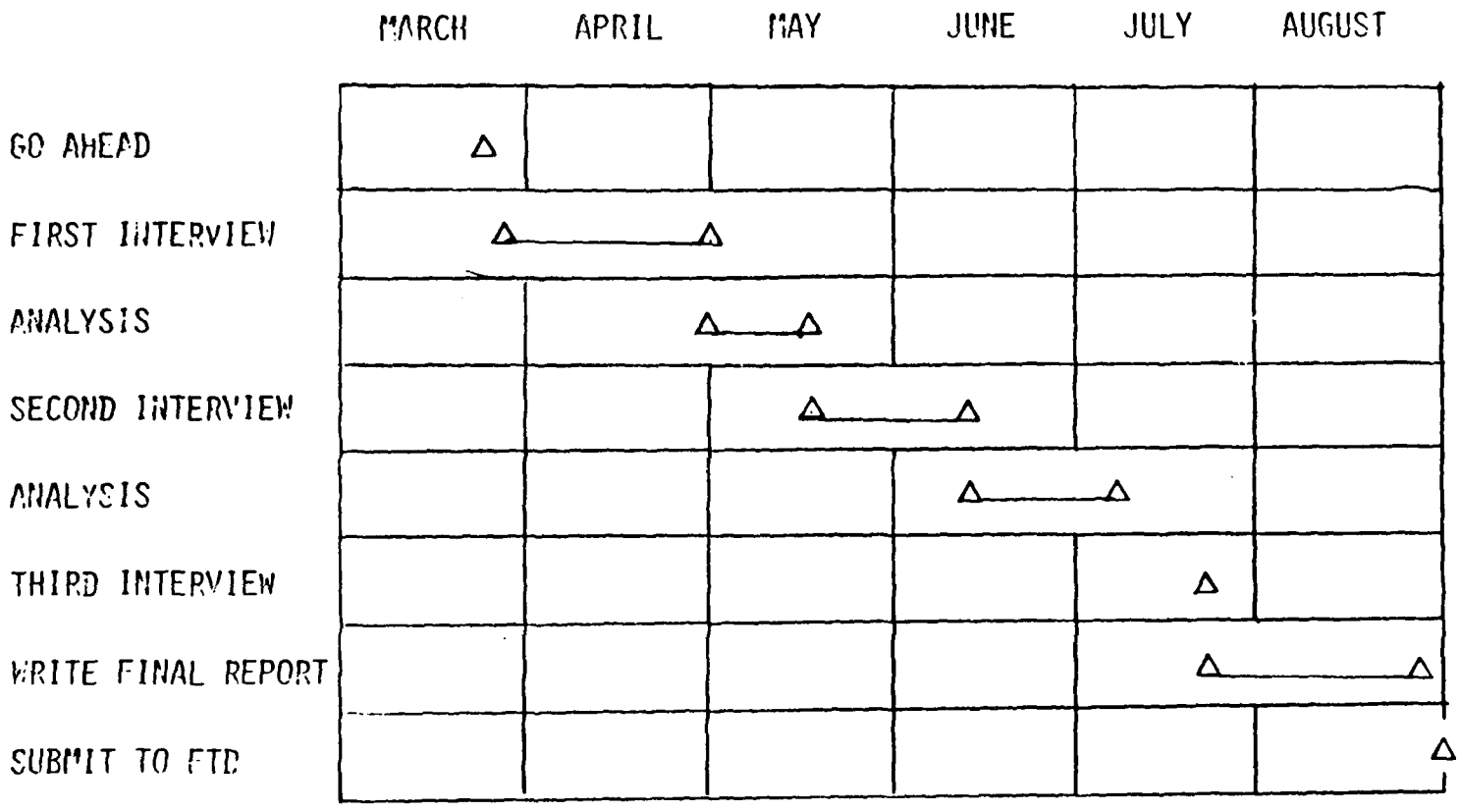
RESOURCES REQUIRED FROM FTD:

- 3 TO 6 HOURS OF TOTAL TIME FROM INVOLVED FTD INDIVIDUALS
- FTD POLICY/STRUCTURE
  - WHAT IS FTD'S MISSION
- CURRENT ORGANIZATION CHART
  - INDIVIDUAL CONTACT'S PHONE NUMBERS

WHAT'S IN IT FOR FTD?

- FTD CSFs WILL BE DEFINED
  - AT NO COST TO FTD
  - IN A RELATIVELY SHORT TIME FRAME
- CSFs ARE A USEFUL IAD IN STRUCTURING INFORMATION SYSTEM
- REPORT OF FINDINGS FOR IMPLEMENTATION PURPOSES

SCHEDULE


MARCH
APRIL
MAY
JUNE
JULY
AUGUST
GO AHEAD
FIRST INTERVIEW
ANALYSIS
SECOND INTERVIEW
ANALYSIS
THIRD INTERVIEW
WRITE FINAL REPORT
SUBMIT TO FTD

Appendix B: Sample Transmittal Letter w/ Attachment

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS FOREIGN TECHNOLOGY DIVISION (AFSC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

10 APR 1983

REPLY TO ATTN OF: XOFF

SUBJECT: Critical Success Factors Interview

TO: TQ (Colonel Wilson)

1. As briefed and discussed on 26 March 1984 at the MIS Assessment Team meeting with the Commander, Critical Success Factors (CSF) is a method for determining executive information needs. Personal interviews identify factors in a manager's environment which must be accomplished to achieve desired goals and objectives.

2 AFIT personnel are assisting FTD in establishing CSF's for an FTD Executive Information System. Your interview is scheduled for 1300, 12 April 1984, Room C204 and will proceed along the following general outline:

a. Interviewer - open the interview

b. Interviewee - describe his mission and roles

c. Discuss interviewee's goals

3. Should there be any difficulty in maintaining the above interview schedule, please contact Mr. J. M. Shawley at 72348/225.

JAMES A. SHAWLLY
MIS Assessment Team

Introduction

Objective: Assist you in comprehending the significant information that is needed to manage your organization.

Process: Critical success factor study as briefed by Major Rasch

- In-depth interview with key executives
  - -- understand missions and roles
  - -- understand goals of each manager
  - -- elicit what factors determine the success of achieving each goal
  - -- make an initial cut at establishing measures for each success factor, and associated information needs
- Review after initial analysis
  - -- define relationships between each individual's CSFs
  - -- important to remember that CSFs are particular areas of major importance to a particular manager at a particular point in time

Nature of interview

- Informal, but structured
- Attempt to establish mission, roles, goals, success factors, and measures, and underlying information needs
- Last approximately 2 hours

Key Definitions

- Critical Success Factors: are the limited number of areas in which satisfactory results will ensure successful performance for the organization, and attainment of the managers' goals.
- Objectives: are general statements about the directions of the organization without stating specific targets to be reached at particular points in time.
- Goals: are specific targets which are intended to be reached at a given point in time.
- Measures: are specific standards which allow the calibration of performance for each goal. They may be "soft" (subjective and qualitative) or "hard" (objective and quantitative).

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Appendix C: Data Analysis Results

CRITICAL SUCCESS FACTOR STUDY

FOR

FOREIGN TECHNOLOGY DIVISION
AIR FORCE SYSTEMS COMMAND

Critical Success Factor (CSF) Process

- Determine CSFs of top executives
  - two hour structured interviews
- Chart individual CSFs
  - intersection of top executives' CSFs represents the set of CSFs for the organization
- Derive the key informational data base requirements
  - from organizational CSFs with objective measures
- Integrate informational requirements of top executives into information system design process

Review Individual CSFs

- Objective
  - validate each individuals' CSFs
    - -- clarify subjective interpretations by interviewers
    - -- add any specific areas not discussed during the interview sessions
    - -- reminder: focus on the key areas of activity in which favorable results are absolutely necessary for a particular manager to attain his/her goals.
  - agree on the set of CSFs for the organization
- Observations
  - found substantial agreement among individual CSFs
    - -- implies that FTD is an excellently managed organization
    - -- striking similiarities exist in managerial viewpoints. Specifically, reliance on good interpersonal relationships.

FTD Critical Success Factor Study

Set of CSFs	Command		Production				Service		
	CC	CV	XO	SD	TQ	SQ	SU	NI	SP
Enhance the Professional Image of FTD									
• Provide Quality Service	(1)								
•• Product Reports	xx			xx	xx	xx	xx		
•• Product Briefings	xx		xx	xx	xx				
•• Current Intelligence Briefings	xx		xx						
•• Product Data Bases						xx		xx	
• Create Favorable Impression									
•• Distinguished Vistor Protocol	xx	xx							
•• Courtesy Extended to Vistors	xx	xx							xx
• Maintain Technological Leadership Role									
•• Participation in Interagency Working Groups				x	xx	xx			
•• Remain at Forefront of Technology				x	xx	x			
Reposition the Intelligence Function									
• Earlier Support for Acquisition Community	xx			x	xx				
• Expand Support of International Community	xx		xx						
• Expand Support of Operational Community	xx			x	xx				

Table 1

Key: (i) - denotes first and second major areas of concern
xx - indicates that CSF was specifically mentioned during the interview process
x - indicates that CSF was identified during 'focusing' session

FTD Critical Success Factor Study

Set of CSFs	Command		Production				Service		
	CC	CV	XO	SD	TQ	SQ	SU	NI	SP
Management of Scheduled and Unscheduled Tasks									
• Monitor Status	(2)		(2)	(1)					
•• Receipt and Sub-tasking	xx		xx	xx	xx	xx			
•• Conversion Process									
•• Translation Process								xx	
•• Analysis									
•• Documentation of Results	xx		xx	xx	xx	xx	xx		
•• Distribution of Results				x	xx	xx	xx		
• Assessment of Resources								(1)	
•• Current Status				xx	x	xx	xx	xx	
•• Workload Analysis -- Impact of Tasking and Requirements Forecasting		xx		xx	x	xx	xx		
• Establish Priorities Between Tasks			xx	xx	xx	x	x		

Table 2

FTD Critical Success Factor Study

Set of CSFs	Command		Production				Service		
	CC	CV	XO	SD	TQ	SQ	SU	NI	SP
Productivity									
• Enhance Intra-Agency Cooperation									
•• Earlier Multi-Sensor Integration			xx			xx			
•• Coordination on QRTs			xx	xx	xx	xx			
• Expand Use of Management Analysis			xx						
• Increase Automated Support									
•• Realtime Product Data Base (reduce paperwork)	xx		xx	x	x	xx	xx	xx	
•• Of Analysis Process (modeling, tools, etc.)	xx		xx	x	xx	xx		xx	
•• Of Report Preparation and Distribution	xx		xx	xx	xx	xx	xx	xx	

Table 3

FTD Critical Success Factor Study

Set of CSFs	Command		Production				Service		
	CC	CV	XO	SD	TQ	SQ	SU	NI	SP
Planning, Programming, and Budgeting									
• Monitor Status			(1)	(2)	(2)	(1)			
•• Five Year Plan	xx		xx	xx	xx	xx	x	x	xx
•• Integrate Requirements Across Directorates			xx	xx	xx	xx	x	x	xx
•• Translate Plans into Programs			xx	xx	xx	xx	x	x	xx
•• Track Budget to Programs			xx	xx	xx	xx	x	x	xx
• Enhance Management of Resources		(1)							
•• Identify Resource Tradeoffs		xx	xx	xx	xx	xx			
•• External Assistance Contracts		xx		xx	xx	xx			
•• Maintenance and Replacement of Equipment Resources		xx				xx	xx		
•• Fraud, Waste and Abuse		xx							
• Promote New Initiatives									
•• Acquire New Methods	xx		xx	xx	xx	xx	x	xx	
•• Acquire State-of-the-Art Equipment	xx					xx	xx	xx	
•• Expand Capabilities into New Discipline Areas	xx		xx	xx	xx	x			
• Status of Major Corporate-wide Objectives (Corporate Plan, etc.)	xx		xx	x					

Table 4

FTD Critical Success Factor Study

Set of CSFs	Command		Production				Service		
	CC	CV	XO	SD	TQ	SQ	SU	NI	SP
Human Resources		(2)			(1)	(2)	(2)		(2)
• Improve Skill Management									
•• Assignment to Projects	xx	xx		xx	xx	xx			
•• Recruitment	xx	xx	xx	xx	xx	xx	xx	xx	xx
• Enhance Employee Career Development									
•• Promotion Potential	xx	xx	xx	xx	xx	xx	xx	xx	xx
•• Training and Education	xx	xx	xx	xx	xx	xx	xx	xx	xx
•• Career Broadening Assignments (Job rotations; working group participation; liasion officer and detachment assignments)	xx	xx	xx	xx	xx	xx	x		
• Improve Employee Attitudes									
•• Retention	xx	xx	x	xx	x	xx	x	x	xx
•• Awards and Incentives	xx	xx	x	x	xx	xx	x	x	xx
•• Harmonious Working Relationships	xx	xx	xx	x	xx	xx	x	x	xx
•• Appreciation of Job Responsibilities	xx	xx	xx	x	xx	x	xx	x	xx

Table 5

FTD Critical Success Factor Study

Set of CSFs	Command		Production				Service		
	CC	CV	XO	SD	TQ	SQ	SU	NI	SP
Safety							(1)		
Security									(1)
• Employee Conduct	xx	xx							xx
• SCI Materials									xx
Major Contributions of Intelligence	xx								

Table 6

AD-A148 250 APPLICATION OF THE CRITICAL SUCCESS FACTOR METHODOLOGY TO DOD ORGANIZATION(U) AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH SCHOOL OF SYST.. 2/2

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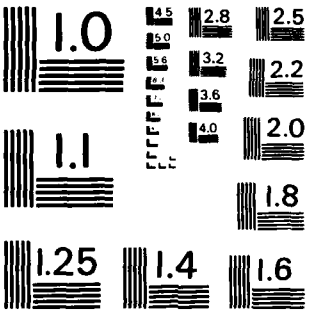


Key Information Data Base Requirements

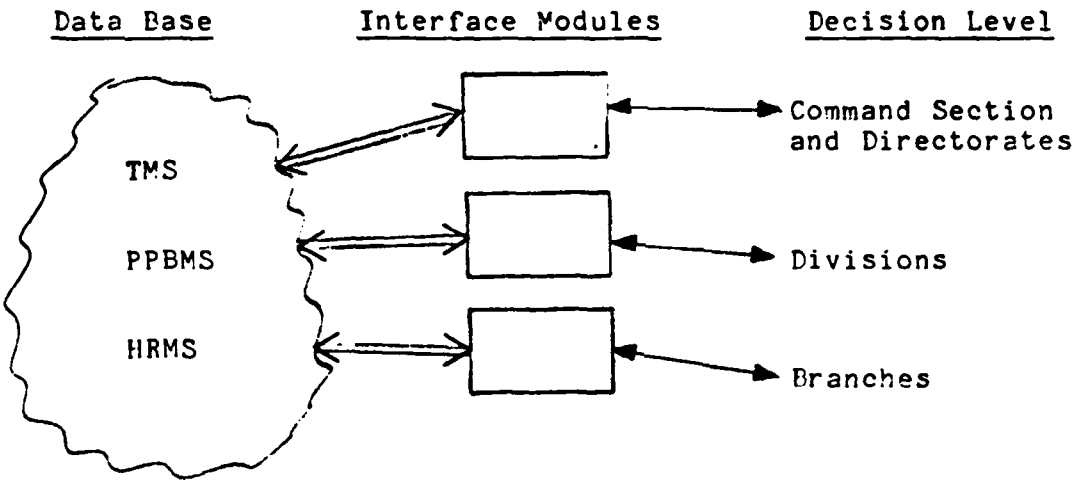
- Define information data base
  - data repositories to make information available for recall and analysis
  - limited role in day-to-day operations
- Key systems identified from organizational CSFs
  - Task Monitoring Subsystem
    - -- from receipt of tasks through completion
    - -- maintain history of tasks
  - Planning, Programming, & Budgeting Monitoring Subsystem
    - -- from initial plan through completion of project
    - -- include all line-item funding
  - Human Resources Monitoring Subsystem
    - -- people data base; including skills, assignments, promotion data, training and education, awards and incentives, security, incidents, etc.
- Limitations of such systems
  - dependent on data collected and maintained
  - cannot answer inferential questions
    - -- What caused a late report?
  - cannot establish causality relationships among data
    - -- What effect does PME have on promotion?

Relationship of Information Data Bases to
Organizational Critical Success Factors

Organizational CSFs	Information Data Base		
	Task Monitoring	PPBS Monitoring	Human Resources
Enhance the Image of FTD • Provide Quality Service • Create Favorable Impression • Maintain Technological Leadership Role	Responsiveness	Initiatives	Participation
Reposition the Intelligence Function	Who is Tasking		
Management of Tasking • Monitor Status • Assessment of Resources • Establish Priorities			
Productivity • Enhance Intra-Agency Cooperation • Expand Use of Management Analysis • Increase Automated Support	Responsiveness	Project Status	
Planning, Programming and Budgeting • Monitor Status • Enhance Management of Resources • Promote New Initiatives • Status of Major Corporate Objectives	Task Analysis Forecast Req.		Skill Analysis Skill Analysis
Human Resources • Improve Skill Management • Enhance Employee Career Development • Improve Employee Attitudes	Task Analysis		
Safety			Incidents
Security			Incidents
Major Contribution of Intelligence	Task History		

Table 7

Suggested Structure of Information System



What Next?

- Need to establish information requirements for Division and Branch level managers.
  - Apply a modified CSF method
    - -- use questionnaire in a group meeting.
    - -- establish managers role in performing mission
    - -- define specific information requirements which support those roles
  - Objective is to link MIS to managers' needs
- Develop decision scenarios
  - Identify typical questions that need answers
    - -- at each management level
  - Allows validation of the identified information requirements.
- Design Prototype Systems
  - Rapid development
  - Lowers risk of developing non-supportive system

Bibliography

1. Ackoff, R. L. "Management Misinformation Systems," Management Science, 14: 147-156 (December 1967).

2. Anthony, Robert N. and others. "Key Economic Variables," Management Control Systems. Homewood IL: Richard D. Irwin, Inc., 1972.

3. Bailey, Kenneth D. Methods of Social Research. New York: The Free Press, Division of Macmillan Publishing Co., Inc., 1978.

4. Ball, Leslie D. "MIS Strategic Planning: You Can be the Captain of the Ship," Infosystems, 29: 33-38 (May 1982).

5. Becker, G. M. and C. G. McClintock. "Value: Behavioral Decision Theory," Annual Review of Psychology, 18: 473-498 (1967).

6. Bullen, Christine B. and John F. Rockart. "A Primer on Critical Success Factors," CISR WP #69, Center for Information Systems Research, Sloan School of Management, Massachusetts Institute of Technology, Cambridge MA, June 1981.

7. Burch, John G. Jr. and others. Information Systems: Theory and Practice. New York: John Wiley & Sons Inc., 1983.

8. Dammeyer, Rod F. "Developing Information Systems to Meet Top Management's Needs," Management Review, 72: 29,38-39 February 1983).

9. Daniel, D. Ronald. "Management Information Crisis," Harvard Business Review, 39: 111-121 (September/October 1961).

10. Emory, William C. Business Research Methods. Homewood IL: Richard D. Irwin, Inc., 1980.

11. Gillin, Paul. "Critical Success Factors Seen as Key in MIS Planning: Exec/Guidlines Outlined for CSF," Computerworld, 17: 24 (18 April 1983).

12. Kanter, Michael. "Use Critical Success Factor Approach," Healthcare Financial Management, 13: 43-44 (February 1983).

13. King, William R. "Achieving the Potential of Decision Support Systems," The Journal of Business Strategy, 3: 84-90 (Winter 1983).

14. Lucas, Henry C. Jr. and Jon A. Turner. "A Corporate Strategy for the Control of Information Processing," Sloan Management Review, 23: 25-36 (Spring 1982).

15. Millar, Victor E. "The Emergence of the Chief Information Officer," Management Review, 72: 29-31 (February 1983).

16. Morton, Maxwell R. "Technology and Strategy: Creating a Successful Partnership," Business Horizons, 26(1): 44-48 (January/February 1983).

17. Poppel, Harvey L. "Who Needs the Office of the Future?" Harvard Business Review, 64: 146-155 (November/December 1982).

18. Rector, Robert L. "Decision Support Systems-Strategic Planning Tool," Managerial Planning, 31: 36-40 (May/June 1983).

19. Rockart, John F. "The Changing Role of the Information Systems Executive: A Critical Success Factors Perspective," Sloan Management Review, 24: 3-13 (Fall 1982).

20. Rockart, John F. "Chief Executives Define Their Own Data Needs," Harvard Business Review, 57: 81-93 (March/April 1979).

21. Rockart, John F. "The Role of the Executive in the New Computer Era," CISR WP #105, Center for Information Systems Research, Sloan School of Management, Massachusetts Institute of Technology, Cambridge MA July 1983.

22. Stonich, Paul J. and Robert N. Gogel. "Strategic Management Diagnosis," Managerial Planning, 30: 4-8 (May/June 1983).

23. Thomas, J. William and Julie Lowery. "Determining Information Needs of Hospital Managers: The Critical-Success-Factor Approach," Inquiry, 18: 300-310 (Winter 1981).

24. Tversky, Amos and Daniel Kahneman. "Judgement Under Uncertainty: Heuristics and Biases," Science, 185(4157): 1124-1131 (27 September 1980).

25. Zalud, Bill. "Decision Support Systems - Push End User in Design/Build Stage," Data Management, 19: 20-22 (January 1981).

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This research investigation analyzes one of the first applications of the Critical Success Factor (CSF) Method at a DoD organization. The DoD organization that the CSF method was applied to is the Air Force Systems Command's Foreign Technology Division (FTD).

The application was accomplished using the CSF method developed by MIT's Sloan School of Management. The CSF method uses a semi-structured interview and open ended questions to determine the critical information needs of the organization's top managers. The CSFs that are determined are those few areas that must be performed satisfactorily in order to accomplish the goals of the manager/organization. Focusing on top managers information requirements, the CSF method is an improvement over other methods that fail to recognize top manager information requirements. The investigation provides sufficient detail and explanations so that it can be used as a guide for determining the CSFs of other DoD organizations. The results of the application of the CSF method at FTD suggest that the CSF method can be successfully applied to DoD organizations for determining top level managers information requirements. The results of this investigation indicate that the CSF method is useful enough to be considered prior to the development of any DoD organization's top level management information system.

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